An Effective Use of Information and Communication Technology in Education Systems of Countries in South-East Europe

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Abstract

The use of technology in schools in reasonably large scale began in many developed countries earnest in the 1980s and in the 1990s. Commercial usage of the Internet and fast development of Information Technology helped convince governments of these countries that the time was right to make large investments in ICTs. In most middle and low developed countries, this process started a little later, and have (until recently) proceeded more slowly. As a result, in the last ten years, education systems began to adopt the use of ICT policies in significant amounts (or are planning to do so). On the other hand, Programs and Curricula from the fields of Information & Communication Technology (ICT), which are the research focus of this paper, have to be updated very frequently as a result of fast development in the last 10 years. The first author of this paper used his experience and knowledge of different Educations Systems situation in SEE Countries, as he was the Member of The Kosovo State Council for Curriculum (KSCC), from 2009 to 2013. The existing structure of the education system of SEE countries need to be supported with the necessary ICT equipment and Software, which will engage the students in the Society of Knowledge. This is also the case for the training and qualifications of teachers, although there are individual cases involving ICT in teacher training programs. Through this paper, which propose the new concept of the education system, the conclusion recognizes the need to introduce ICT and EU standards. Management Systems in the field of education of SEE countries are mostly outdated and inadequate and does not use the possibilities offered by ICT. Hence there is a need to introduce ICT in the management system and the system that ensures the quality of the education system. This research paper investigates the importance of ICT and the impact on: curriculum development and implementation, Student/Learner-centered teaching/learning, Competency-based approaches, Integrated teaching and learning, Flexibility and mobility, Transparency and accountability. Finally, the research shows that the ICT and e-learning literacy of teachers needs to change and academics need to embrace new technology since SEE countries are now reconnected to the most recent developments in science, technology and culture. The methodology of the research is focused on the comparative model of this issue, between the models in EU and South-East European Countries (SEE). The main conclusions and recommendations will be useful to be implemented within Educational Systems of SEE countries, and as an impact, the contribution of the paper will be shown as a possible model of Education System supported be ICT in the countries of SEE

Keywords: *Information, Communication, Technology, SEE, Education, Programs, ICT, Curricula*

1. Introduction

Southeast Europe or Southeastern Europe is a geographical and political region located primarily on the Balkan peninsula. Sovereign states usually included in Southeast Europe are: Albania, Bosnia and Herzegovina, Bulgaria, Greece, Kosovo, Macedonia, Montenegro and Serbia.

The research on the Paper explores whether ICT can enhance the competency-based curriculum in SEE Countries within the new revised Curriculum Framework. The paper also looks at the effects of ICT literacy in all main features of the curriculum stages and their result with Student Personal development of key competencies such as: communication and expression, thinking and learning, Life-, work-, and environment-related competencies etc.

The optimal usage of ICT in Educational System is one of the responses to the challenges that aims at providing a foundation to increase the quality and equity of education services for all students, and to reconnect the education system with trends and issues linked to recent education reforms in other progressive systems.

The aim of this research paper can help to map out what is happening in the countries of South-East Europe related to the use of ICTs in education. While the information in such regional reports can rather quickly become dated in some cases, given the pace of technological change, they still provide useful points of departure for further inquiry.

Information about developments in many of the countries of the South-East Europe, for example, has not, for the most part, been widely disseminated outside the region (indeed, for many within the region as well!).

The Curriculum Framework in SEE countries is meant to set the basis for a coherent and qualitative functioning of the system in line with principles such as: learner-centeredness, flexibility and inclusion. While defining a common "*core curriculum*" in terms of quality learning outcomes, it cater also for the local needs and contexts through introducing a part of the school-based curriculum. Such changes, are in line with international effective education/curriculum policies and practices.

Information and Communication Technologies (ICT) are part of our everyday life and permeate many activities, such as working environments, daily communications and relationships, handling of administrative affairs, etc. They have become a basic priority and a key driver in politics, economics and -more significantly for this issue- education. However, it is necessary to promote further digital equity in order to enhance social inclusion in/through this migrating process (Bélisle, C., 2006).

2. Knowledge Society and the need for ICT in the Education System

Considering the development of Information and Communication Technology, and the professional opinions of leading educators, as well as the opinions of students, parents, and other stakeholders, there are several reasons for a comprehensive usage of ICT in Educational System:

- The aims and objectives of educating young people through the education system have to be clearly defined, in terms of serving as a basis for further curriculum development and as a reference for assessing and evaluating students' learning achievements.
- General orientations for teaching and learning in a formal education system have to be provided for teachers, parents, learners, developers of teaching and learning materials, evaluators and other stakeholders based on common framework.
- Students have to be equipped with knowledge and skills from the perspective of lifelong learning and of a learning society (especially through ICT). Due to the complexity of today's world, learning cannot be reduced only to the period of formal schooling, but has to be emphasized as a permanent dimension in a person's life.
- There is a need to avoid learners being overloaded with irrelevant or outdated information/data and stimulated only with regard to the development of lower level intellectual skills. The new curriculum fosters a balanced approach in teaching and learning with regard to providing students with valuable and updated knowledge, while also helping them develop valuable skills and positive attitudes towards themselves, others, learning and life.
- Schools and teachers should be encouraged to introduce and use new learning strategies, from the perspective of a learner-centered approach and of an interactive methodology.
- The democratic changes in society and its pluralistic character have to be reflected through the new curriculum.
- The principle of school autonomy has to be cultivated through the new curriculum as well.
- The interdependencies of today's world, as well as new developments in the labor market, in terms of ensuring the pre-conditions for mobility and for enabling students to compete successfully in the local and international labor market have to be taken into consideration for the design of the new curriculum.

3. How to strengthen ICT literacy in SEE Countries?

ICT Literacy has become one of the main competences in this century. Without being able to use Information and Communication Technology effectively and responsibly the chances on the global market are very low. Nowadays more than 250 million Europeans are regular visitors to the Internet. Yet despite this encouraging figure, large sections of the population continue to be barred from the multiple new opportunities. But even those who are using the new ICT media regularly are not imperatively ICT literate. Information and Communication Technology literacy does not only mean that the people possess the technical infrastructure, it also means that they are able to maximize the possibilities these new technologies offer to them (Lankshear, C., Snyder, I. and Green, B. 2000).

ICT literacy can be seen as conceivable on three levels, we may approach ICT/digital literacy in the same vein, seeing it as operative first at the level of technique, of the mastery of digital competences, secondly at the level of thoughtful usage, of the contextually-appropriate application of digital tools, and thirdly, at the level of critical reflection, of the understanding of the transformative human and social impact of digital actions (Fig. 1).

Figure 1. Levels of ICT/Digital Literacy
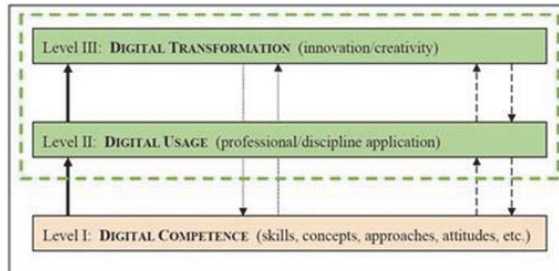
Source: Beqiri, 2010

ICT competence is a requirement for and precursor of ICT literacy, but it cannot be described as ICT literacy (Bélisle, C., 2006).

4. Trends and state of ICT usage in education in SEE Countries

ICT usage in the education system is every day more present, which lead to the need for education of all participants in the education system. In the Education Systems of SEE countries, much of the work on ICT has concentrated on skills and education for students or learner, however, a crucial area must be the ICT literacy levels of teaching staff that are responsible for the development and implementation of the Program (Webber, S. and Johnston, B., 2000). Following on the Project of Curriculum Framework, Kosovo State Council for Curriculum authorized the first author of this paper, to do the 6-month Research of the usage of ICT in Education Systems of SEE countries. This research carried out a survey of teaching, managerial, administrative and technical staff, to establish how staff access and use ICT within their work environment. The research found there were a general lack of staff awareness about ICT skills and a lack of training for staff, in particular non-teaching staff. Where training existed, it focused primarily on the basic courses of ICT skills and where staff had received training in the development of ICT skills, this was mainly in the form of a one-off training session to support the introduction of a new service or resource.

Education systems of SEE countries has adopted different management access for implementation of ICT in education (Schleicher, A., 2006).

The main objectives of informatization of education are as follows:
-    to provide the basic ICT literacy
-    to offer basic and professional technological education
-    to equip education institutions with Information and Communication Technology.

The first two objectives are dealing with education institutions as a public service, and the third is focused on the usage of ICT in the process of education.

Without being able to use Information and Communication Technology effectively and responsibly the chances on the global market are very low. Nowadays more than 300 million Europeans are regular visitors to the Internet. Yet despite this encouraging figure, large sections of the population continue to be barred from the multiple new opportunities. But even those who are using the new ICT media regularly are not imperatively ICT literate. Information and Communication Technology literacy does not only mean that the people possess the technical infrastructure, it also means that they are able to maximize the possibilities these new technologies offer to them (Lankshear, Snyder, and Green, 2000).

4.1 Cross Country Analysis (Education and ICT Scenario)

The IT and telecom sector in SEE countries have made significant progress. Most of the SEE countries still has very limited bandwidth per Internet user and low home computer and Internet penetration rates. It is surprising to see such a low Internet penetration rate particularly since the price basket for Internet services is low when compared with other countries out of the region. This suggests that price of ICT services is not the main barrier to higher ICT levels; it is more likely due to limited ICT infrastructure or limited access to it.

Another challenge for the ICT sector is the large digital divide prevalent in the country.

Some of the key ICT indicators for the Country are given as follows:

Table 1. ICT Indicators - SEE Countries

| Country of SEE	Internet users (per 100)	Internet subscribers (per 100)	Broadband subscribers (per 100)	Personal computers (per 100)
Albania	26.91	11.09	10.45	13.17
Bosnia and Herzegovina	27.53	13.38	12.57	16.21
Bulgaria	28.19	14.02	11.25	11.43
Greece	46.12	41.01	35.21	37.22
Kosovo	24.29	13.23	10.02	12.99
Macedonia	25.86	14.03	14.11	14.87
Montenegro	28.87	15.01	13.11	14.01
Serbia	28.02	15.19	14.95	15.16

Source: Authors own research

Adult literacy levels in Countries of SEE is in the level of most EU countries (84% for males and 72% for females) with strong gender disparity. However SEE countries has made significant progress in terms increasing access and gender equity at the primary and secondary level.

The ICT sector in SEE countries has made steady progress with rapid growth in mobile telephony. Mobile coverage reaches more than 90 percent of the population though there is still scope to increase mobile usage. Despite having extremely affordable mobile services, internet costs for the country are high, this results in an extremely low internet usage rate.

Most of the countries of SEE (except Montenegro), are counted as one of the most densely populated countries in the world with a high incidence of poverty. SEE countries are developing with continuous domestic and international efforts to improve their economic condition.

Graph. 1. ICT Indicators - SEE Countries
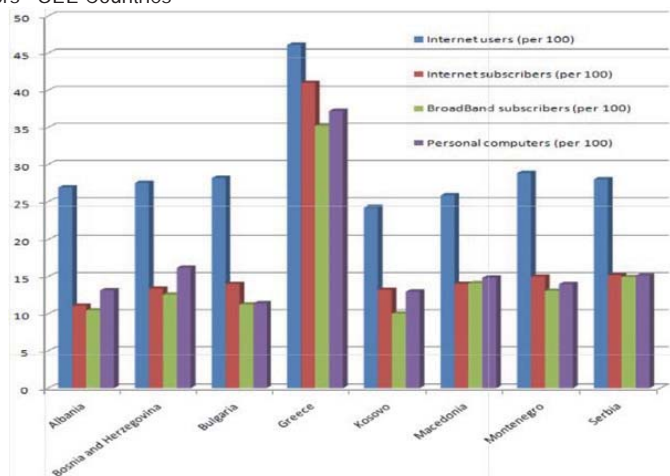
Source: Authors own research

4.2 Policy Framework for ICT in Education

In most of the SEE countries, the Ministry Education is responsible for formulating policies and programmes, monitoring and evaluation and initiating legislative measures pertaining to primary, secondary and non-formal education. In all cases of SEE countries, for post secondary and higher education, the Ministry of Education is responsible for policy formulation and implementing programmes. The MoE also oversees the administration and development of schools, colleges and institutes. To carry out its functions, the ministry consists of the Directorate of Secondary or in some countries (ex. Kosovo) Directorate of Pre-university Education and Directorate for Higher Education and the Directorate of Technology and science.

In the recent years countries of SEE, included also Department of Science and Information and Communication Technology as an effort to encompass the development of ICT. These departments are responsible for providing policy framework and institutional mechanism for developing the ICT sector.

Table 2. Legal Framework for ICT in Education

Ministry or Department in the country of SEE	Key Responsibilities	Departments/Divisions
Ministry/Department of Primary or Pre-university Education	Formulating policies and programmes, monitoring and evaluation and initiating legislative measures pertaining to primary and non-formal education	- Directorate of Primary Education - Directorate/Bureau of Non-Formal Education and LLL - Compulsory Primary Education Implementation Monitoring Unit
Ministry of Education / Department of Secondary and University Education	Formulating policies and implementing programmes pertaining to secondary, post secondary and higher education	- Directorate of Secondary - Directorate Higher Education - Directorate of Technical Education - Non-Governmental Teachers' Registration and Certification Authority
Ministry/Department of Science and Communication/ Technology	Providing policy framework and institutional mechanism for developing the ICT sector	- Department of Science - Department of Technology - Department of ICT

Source: Authors own research

The table below briefly outlines the objectives of relevant national level policy documents that need to be adopted in several SEE countries:

Table 3. Documents related to ICT in education needed to be adopted

Document need:	Relevant Objectives:
National ICT Policy in Education of SEE country	- ICT literacy and access to schools - Social equity in using ICT - Building ICT infrastructure - Larger pipeline of ICT professionals - Provide incentives for e-learning content development - Provide computers to all schools - Ensure IT literacy for all students who complete basic education - Use ICT to extend the reach of education - Use ICT to improve quality of teachers - Use ICT to enhance student learning - Integrate ICT into the curriculum
Information and Communications Technology Policy and Strategy	- Expand ICT infrastructure to educational institutions - Develop adequate ICT literacy curriculum for schools - Share educational resources throughout country of SEE - Encourage adoption of open source software - Use Internet technology to provide education - Raise awareness and promote ICT - Ensure affordability of ICT services - Establish a national education intranet

Source: Authors own research from web sites of the Governments of SEE countries

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From this research, authors can point that most of SEE countries does not have any distinct ICT in education policy. The imperative to develop a national ICT policy largely comes from recognizing the need to develop adequate human resource to strengthen the ICT market.

Most of the countries in the South-East Europe region have realized the need for training teachers in ICT and have launched various professional development initiatives. However, many of these training activities to date focus mainly on computer literacy instead of enabling teachers to integrate ICT in their day-to-day teaching activities and master the use of ICT as an effective tool to improve teaching and learning. For the SEE region, apart from the Ministry of Education and International agencies, there have been various government initiatives and NGO activities in generating awareness and providing quality Training for ICT in education. The major teacher training initiatives across the region are summarized in the table below:

Table 4. Major teacher training initiatives across the SEE countries

Country	ICT Education Project1	ICT Education Project2
Albania	**Potential Program Model** Follows a train-the-trainer model to provide computer skills to the lowest strata of society	**INIMA** Institute INIMA have been equipped with ICT facilities. Through the virtual learning environment developed for the Education Development Centre, teachers can receive training through online courses at the centers
Bosnia and Herzegovina	**ICTSD,** Provides ICT skills and development training to teachers in the country	**Teacher Education Program** Under this project, an ICT course will be developed and piloted which aims at instilling technology aided teaching methodology skills
Bulgaria	**ETLP – Project** Instills ICT skills required to enhance the teaching and learning process	**Training of Trainers (ToT)** OLE provides teacher training and Training of Trainers (ToT) packages
Greece	**ICT Teach Program** Provides in-service and pre-service teacher training to help teachers integrate technology in the class room **Reach:** More than 50% teachers across the country	**A Laptop for Every Teacher** This scheme provides few hundreds of laptops a year to teachers with the condition of paying monthly charges for a period of five years
Kosovo	**Support for Teacher Education Program** USAID and MEST provided assistance to teacher education institutes in developing an ICT enhanced curriculum as well as a selective ICT subject within the curriculum	**Integrate ICT Technology in the Classroom** Provides in-service and pre-service teacher training to help teachers integrate technology in the class room. More than 200,000 master teachers have been trained
Macedonia	**Teacher Education Project** Several teacher training institutes were provided with multimedia resource centers to complement the traditional delivery mode. A mobile training team was also formed to train teachers on using laptops and video equipment	**Computers in Schools** Under this project, support was provided for procurement of computers, software and connectivity to government schools. SMART Classes were also set up in central government schools systems
Montenegro	**Teacher Training Programs** The project aims to implement teacher training programs for 5,000 teachers. The	**ICT-Teacher Project** The project offers ICT training to teachers. The teachers can also learn how to integrate ICT into the classroom
Serbia	**Computer Aided Teaching (CAT)** An initiative to help teachers familiarize themselves with ICT and use it to improve their teaching skills	**ICT for Competency Project** The project aims at providing basic training programs for teachers to develop computer skills to enhance their professional competency

Source: Authors own research from web sites of the Governments of SEE countries

5. Education in SEE countries from perspective of the International and global context

ICT literacy will helps in some of the additional challenges and opportunities faced by the society of SEE countries (Beqiri, 2010), including:

- *Knowledge society and economy*. Due to rapid technological and social developments over the last decades,

access to knowledge (especially through ICT) is now virtually unlimited, resulting in the democratization of knowledge worldwide. Knowledge is seen today as an increasingly important means of wealth generation and production. Because of this virtually unlimited access to information and in order to cope with new contexts and challenges, schools need to help young people develop the competences to access and process information independently and responsibly, as well as to develop broader competencies for life and work.

- *Increased interdependencies and mobility*: Owing to the effects of globalization (for example, on communication, finance, travel, education, culture, migration, life styles,) communities everywhere are today increasingly interdependent, This affects individual and collective identities and what is seen as "universal" or "international" as opposed to traditional, "local" and "national".,. More than ever before young people have to be able to adapt to rapid and unpredictable change, for example, the recent world economic and financial crisis, the spread of diseases and constantly emerging conflicts.
- *Learning to Live Together*: The 1996 UNESCO Delors Report highlighted "Learning to Live Together" as one of the main challenges in an increasingly open and inter-dependent world, including the constructive management of diversity, peaceful conflict resolution, tolerance, self-respect and respect of the other intercultural understanding and effective communication. "Learning to Live Together" is also a priority for Kosovo with regard to the process of European integration in which it aims to take an active part. This entails the promotion within Kosovo of values and practices associated with inclusion, democratic citizenship and Human Rights in the context of public, professional and private lives.
- *Sustainable development*. In an increasingly globalised world in which the quality of life on Earth for the current and next generations is under serious threat, learners need to be equipped with the knowledge, skills and attitudes to sustain the environment and avoid the waste of resources. This requires young people to be made aware not only of the principles and practices of social cohesion and inclusion but also of how to effectively battle against poverty, marginalization, discrimination and injustice.

Education, research and development are the foundations of the forthcoming information society, i.e. knowledge society. This claim also refers to education related to information and communication technology. The elementary and high school education must allow for young people to grasp the concepts that are somewhat invariant with respect to the current state of the technology, in order to ease the gaining of new skills and knowledge needed for the use of the newly formed technological aspects in the future. The education system must wake the interest of students for independent studying and enable them for constant lifelong learning (Lankshear, C., Snyder, I. and Green, B. 2000).

For high education levels there is a need to make a choice of subjects and models of undergraduate curricula from the area of information and communication technology, adapted to specific university groups. It would be suitable to organize lifelong learning in the information and communication technology field in the form of interdisciplinary specialization courses. Science in the knowledge society must use the existing and newly formed knowledge funds, much more extensively than before, to choose, form and transfer to the general public those kinds of knowledge that it considers critical for progress. Without its own science, the country cannot have a good education system.

The information and communication technology will certainly strongly mark the period comprising the next couple of decades. The education system must enable the young who are currently enrolled in elementary and high schools, as well as those who are about to enter the schooling system, to live in the society of knowledge. Further, the education system has to face the fact that the students must be prepared for lifelong learning, the phenomenon that is becoming a necessary prerequisite for successful functioning in the future knowledge society. In the same manner, the schooling system must become a part of the realization of the concept of lifelong education.

Creation of the System of Education that is based on optimal ICT usage in SEE countries can be achieved with:

- Constructing the model of syllabus in the area of information and communication technology for elementary and high schools. Special attention should be given to educational programs that develop and stimulate inventiveness from the earliest ages. In both elementary and high school syllabi, attractive promotional activities for the information society should be included.
- Organizing and putting into practice systematic training of all teachers for the area of information and communication technology. This education should be organized with the help of institutions of higher education, of experienced schoolteachers, as well as of experts from local companies. Such education should take the form of organized lifelong learning with adequate examination of acquired knowledge (Beqiri, 2003).
- Setting a realistic minimal standard that the schools will have to satisfy, immediately rendering that standard possible and adapting it every year.
- Models for alternative financing should be built and programs for equipping the schools should be directed

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towards shared use of infrastructures with local communities and shared use of infrastructures of school business systems and that of the Ministry of education.

- Forming a plan for systematic provision of computer equipment to schools and making detailed plans of financing that will allow the school system to include as much as possible of the latest information and communication technology, but also to make use of older equipment, which is either already present in school systems or can be received through various donations.
- Organizing a good maintenance service and providing financial means needed for the maintenance of equipment.
- Allowing organization of classes for adults in all schools in the local environment, in cooperation with the private sector and with participation of teachers trained in the area of information and communication technology.

For all of the university institutions, there should be detailed proposals for contents frameworks from the area of information and communication technology, which are being included in the curricula and syllabi. For those university departments that educate students for professional work in the area of information and communication technology, detailed proposals of curricula and syllabi drafts should be made, having in regard the specific needs of the economy and society in general.

In SEE countries at the university level, this can be achieved with:

- Developing guidelines for the inclusion of information and communication technology in the curricula and syllabi for every group of universities. The guidelines need to contain elements for evaluating parts of the curricula and syllabi that concern information and communication technology.
- It is recommended that the universities that educate experts for the area of information and communication technology include ethics in their curricula.
- Immediately Increasing the number of students in university courses directed towards education in the field of information and communication technology.
- Gradually increasing the number of teachers and researchers that are directed towards the field of information and communication technology.

There is a need to establish additional means for systematic training of experts in various fields, in order to make them competent for adopting the information and communication technology and for interdisciplinary activities in the creation of new products and services.

University institutions and other research institutions in SEE countries need to be interconnected by high bandwidth connections and equipped with latest products of the information and communication technology.

The information and communication technology is developing very quickly, which poses significant demands on the research activities that will maintain the development in future years in order to establish a continuity towards future and approaching technologies. Science of SEE Countries can and needs to participate in such fundamental and applied research more than ever, at the same time strengthening international cooperation. It is necessary to form large research teams directed towards national priorities and involving more institutions, which is also a prerequisite for obtaining European projects. However, science itself is being assigned a very important additional role in the society of knowledge. Apart from the fact that scientists have to strive for new scientific knowledge, they have to use existing and newly-formed science funds much more prominently than before, in order to choose, form and transfer to industry and general public those kinds of knowledge that they consider critical for the advancement of mankind.

6. ICT and Knowledge society in SEE Countries

ICT is undoubtedly today's most generic prevalent technology. Its impact on human development is more important than the impact of technologies from the past. Today's use of computers and networks is only the opening phase of the next era of ICT everywhere.

SEE countries should create conditions for the spread of research, development and application of all types of ICT, which are prerequisites to join the EU developed countries. This technology can significantly influence the overall progress of society and serve as a basis for resolving critical issues. The use of ICT in education facilitates the development of the information society, therefore a knowledge society, where knowledge becomes the main factor of production.

While analyzing the strategic role of information and communication technology in a future period longer than several years, the forthcoming technology changes must be considered. The SEE countries must join the countries that

actively participate in the development of ubiquitous information and communication technology.

From the research, authors came in conclusion that the objectives of all SEE countries Policy-makers are to:

1) Create platforms for sharing policies, challenges, experiences and innovations across countries in the SEE region and beyond; and
2) Provide regional directions and country-level support towards designing a policy-driven roadmap for scaling up ICT-enabled educational innovations at the school level, to cover:
   a. Identification of scalable and sustainable ICT-enabled educational models and innovations in the SEE region;
   b. Fostering multi-directional dialogues on policy, research and practice for scaling up and deep-scaling ICT-enabled educational innovations at the national level;
   c. Examination of existing country opportunities, limitations and untapped resources in implementing scalable innovations against present state of policy, capacity or partnership.

6.1 Optimization of Information and communication infrastructure

SEE countries should and can build the infrastructure of ICT based on the general technical and market principles, to enable its citizens participation in the information society with the new choices for life, employment and labour, learning and creativity and to use the opportunities of the new economy during the transition from the industrial to the information society.

Development should be directed toward a multi - service network with a range of services that match the needs of the citizens and the economy, including mobile broadband and internet access, the new generation of internet and Universal Mobile Telecommunications System (UMTS). In the shortest possible period a liberalized telecommunications market should rise in line with the European model, for which part of the products and services will be researched, developed and manufactured in the SEE countries itself (Webber, S. and Johnston, B., 2000).

The research of this paper concluded necessary needs for the optimization of the ICT infrastructure as follows:

- Construction of a cheap, fast and secure infrastructure through the creation of information and telecommunications market with competition in the provision of all services, with direct influence on telecommunications operators and service providers regarding the application of new technologies and implementation of new services.
- Stimulation of research, development and production of information and communication equipment and services through operations of existing and new high-tech companies.
- Directing and supervising investments in the development of information and communication infrastructure towards a multi-service network with a set of services corresponding to the needs of the economy and the citizens, including broadband and mobile Internet access, new generation of Internet and Universal Mobile Telecommunications System (UMTS).
- Taking care of procurement conditions for the equipment for operators and service providers, completely or partially owned by the state and state institutions.

Establishment measures to:

a) achieve the responsibility and influence of SEE science and professional environment in the development of the information and communication infrastructure and the partnership of the public and the private sector,
b) protect the interests of the SEE Countries by the same mechanisms by which the European union protects its interests in the world,
c) establish supervision of information and communication operations based on the European Union principles.

Connection to the European activities for secure infrastructure and acceptance of priority measures from the eEurope Action Plan:

a) Increase in availability of secure transmission technologies and products with IPSec and IPv6 and protection of privacy.
b) Implementation of smart cards.
c) Coordinated approach to cybercrime prevention

In studying the various ICT for Education initiatives in the different focus countries of SEE, it emerged that initiatives are successful precisely because they are able to pull together many different elements in an organic and integrated manner, supported by a robust yet flexible policy framework. Very broadly a graphical depiction of what may be understood as an ICT for Education System can be shown in the figure below.

Figure 2. ICT for Education System
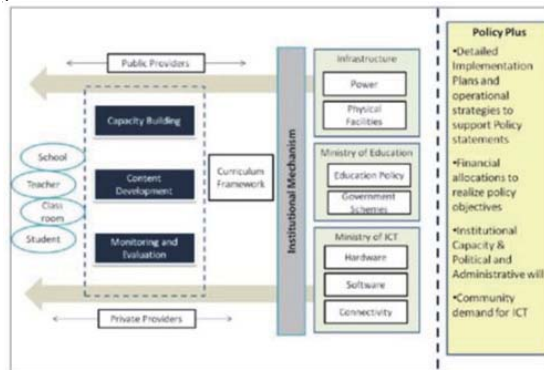
Source: Beqiri, 2010

7. Approach and participation of academics and students in the information society

The See countries should enable for all citizens to access and participate in the information society, by developing the information and communication infrastructure all over the country, taking special care of young citizens, citizens with special needs, elderly citizens and poor citizens.

This approach is possible with offering of the:

- Free Internet connection and use for all schools, with the aim of providing students with access to multimedia services in class.
- Applying the general service obligation and enable the citizens to access the basic public information: legal and administrative information, culture, environment and traffic conditions, and gradually electronic access to public services and education institutions.
- Enabling access to information services from public access points in schools, libraries and local community centres, which is especially important for youth and citizens who have no other possibilities to access the Internet. Analyze special billing schemes for citizens with low revenues.
- Lifting duties and introducing relaxations and thereby influencing the prices of information and communication equipment and software, especially for education and personal use.
- Stimulating, in compliance with the eEuropean initiative, application of the "design for everyone" principle for information and communication technology products and services. Taking care of people with special needs in purchasing information and communication products and services.
- Solving the involvement of less developed regions by universal services principles and financial instruments to support the development of information and communication infrastructure and free Internet access in public places.

The information and communication infrastructure and electronic learning should become strong support to the development of the SEE Countries that will enable the transition into information society, increase employment, keeping young experts in the country and increase the competitiveness of companies.

The creation of electronic administration should enable the provision of fast and quality services to citizens and companies and to insure rational usage of the state budget. The information and communication infrastructure enables new and flexible ways of work, access to cultural and national information in digital form, and availability of health information and services to citizens and health professionals (Martin, A., 2006).

8. Heading towards software and innovation

Among its prioritized development directions in the economy, the SEE Countries should put on the first place the information and communication technology, with the accent on software and direction towards network applications, services and protocols. Software demonstrates the knowledge built into systems, and such highly valuable intellectual and ecologically clean products are providing the opportunity for growth on the world market. In the SEE Countries, the three layered model of an innovative organization, which includes knowledge, know-how and creativity, and the model of

an innovative information-communication firm should be promoted, supported and encouraged in its development.

This model can be created with the:

- Balancing the development of all elements of the added value chain in the area of information and communication technology, taking into account that priority will be given to the development of services and applications, and the software elements for the multiservice network, as parts of the chain with higher added values.
- Conformance with ISO (International Organization for Standardization), CMM (Capability Maturity Model) and other standards in the area of software engineering. Detailing the body of knowledge necessary for software engineering.
- Tax benefits for all firms in the information and communication technology area that are providing quality programs for permanent education of their employees.
- Preparation for and free education on the model of the innovative firm for all firms which are completely or partially owned by the State. On invitation, this would be open to others as well, with appropriate compensation.
- Development of technological parks and incubators of the enterprise spirit, taking into account experiences from successful foreign models.
- Creating conditions, recognizing, supporting and promoting innovative solutions and their presenters. Establishing measurements for the efficiency and innovation (ideas, patents, products) of the research and development units in the information and communication area. Introducing comparative evaluation, recognizing and rewarding the best ideas, patents and products, and marketing support for new Croatian products.
- Ensuring stimulations, conditioned by the results achieved in the formation of the own research and development. Introducing a yearly tax return for every increase in the research and development potential in the information and communication technology as a production sector.

Several university units that create top experts, several large and many smaller firms that encourage innovativeness and the ability of abstract thinking and imagination important for software products and services, those are the forces of the SEE information and communication technology. The increased needs of European Union for this kind of technology, together with the global lack of experts in the field, should, with rapid action, provide the SEE Countries with the opportunity to develop and increase employment. Therefore, the SEE Countries needs to create conditions to double the income and the number of employees and to triple the exports in the area of information and communication technology as a production sector every three years.

To create condition for this, SEE countries already started with the Education reform, at the university level in particular, in order to provide the necessary number of experts and managers capable of working in the information and communication technology as a production sector.

With the Education reform the objectives are oriented in:

- Increasing the number of graduated experts in the area of information and communication technology for positions in the research, development and production, with further continuous growth, together with the creation of managers for this area.
- Starting at least one major and for the SEE Countries important development project in the area of information and communication technology at each ministry or state institution. The realization of the project would be assigned to economy subjects with research and development departments located in South-East Europe. The assignation would be conditioned with cooperation with universities and independent scientific research institutes.
- Initiating at least one research project in the area of information and communication technology per each ministry or state institution. The project realization would be assigned to universities or independent scientific research institutes, and would be conditioned with cooperation with the economy.

9. Conclusion

Like other regions, there is a wide range of both intention, ambition, and implementation across this set of countries of SEE. Compare, for example, Greece, where all schools are connected to the Internet, interactive whiteboards are in common use, and lots of digital learning materials are available, with a place like Albania, Bulgaria, Kosovo and Macedonia, where ICT use in education is still in the early stages, with targeted investments at a few grade levels -- primarily in support of an 'informatics' (i.e. computer literacy) curriculum.

Through the delivery of ICT literacy programmes, which are both timely and integrated, partnerships with teaching and learning support staff can be strengthened. Teachers need to work with new groups of professionals, they need to develop new skills, in particular teaching skills, which enable them to deliver these programmes where appropriate, using technology. E-learning is offering exciting and new possibilities which the teacher need to reach out and seize. The key to success is to get out of the school, build partnerships with teachers and learning technologists and infiltrate their networks.

As shown in this paper the definition of ICT literacy is very broad and cannot only be focused on the use of the Internet or computers in general. Besides the technological ability to use a computer, the user also has to be capable to deal with all the information gained in the Internet and to continue to use this information in an effective and responsible way. To remain ICT literate is thus an ongoing process which means to learn and to use new technologies continuously and to adopt all these processes in everyday life.

the impression that the specter of 'informatics' has cast a heavy and often determining shadow over investments in computers in schools across the region, which in many cases have been closely linked with efforts to expand access to informatics courses - typically within the confines of school computer labs. This is, not unlike how things have developed in other regions of the world, but the impression this research leaves on authors is that this influence is comparatively stronger in this region than in most others. Technical support and maintenance is a problem in many places: Almost a third of computers in schools in Macedonia, for example, weren't working when survey work there took place.

The authors study finds "a remarkable unanimity in the identified constraints on ICT development and effective use in basic education", with challenges related 'divides' of various sorts (for example, between urban and rural); inadequate school infrastructure; insufficient teacher training (compounded by lack of sufficient attention to how to motivate and support older teachers in their use of new technologies); and lack of digital materials in local languages. Not surprisingly, funding is often stretched quite thin. Core components of the educational landscape (curriculum, assessment mechanisms, etc.) have remained largely the same, and so have not been modified to take advantage of some of the affordances offered by the introduction of ICTs. Studies on the impact and effectiveness of ICT use in education remain few and far between, in part due to a lack of adequate mechanisms and funding to support such activities.

This also implies that the need for support to strengthen ICT literacy competences of all citizens of SEE countries will continue to exist. If the fast development of new technologies does not decrease the demand to receive additional support to strengthen ICT literacy will not decline, and the need to develop more large-scaled ICT literacy initiatives will thus continue.

Some key findings from the research in this Paper are:

- While the importance of ICT in education has been recognized widely, it is still in its infancy in most of the region and its role and impact have yet to be fully determined or realized.
- While all the participating countries consider effective teacher training in ICT skills to be among the key determining factors in its effective ICT use, most are not providing sufficient training to use ICT to best effect.
- There is an urgent need for governments to adequately fund school ICT operational costs.

The school in SEE country is no longer simply a physical building; it is a vast collection of digital resources, many accessible from the desktop, anywhere at any time. Teachers need to ensure their place in the virtual world of learning is as central as it was in the physical world.

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